GLOBAL BIOECONOMY SUMMIT 2024

One Planet – Sustainable Bioeconomy Solutions for Global Challenges

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Communiqué

International Advisory Council on Global Bioeconomy

Summary

Bioeconomy has come a long way from an idea to a powerful principle that changes how we meet global challenges. Global alliances are required to transform our economies, reduce dependence on fossil fuel and address hunger, and become resilient towards climate change while respecting the planetary boundaries.

The Bioeconomy shapes a new era that recognizes the planet as the interconnected home for all human beings alongside animals, plants and microorganisms, respecting and preserving (or re-establishing) their habitats.

The current economic models based on the fossil economy need to be substantially transformed as soon as possible. The Bioeconomy is a key solution to building an economic system which is based on sustainable economic growth and increased circularity, while protecting and regenerating ecosystems, and embracing principles of renewability. Given that the current defossilisation efforts are insufficient, it is now urgent to move away from siloed thinking and integrate bioeconomy tools and processes into economic frameworks for sustainable socioeconomic transformation and planetary good.

The bioeconomy is the production, utilization, conservation, and regeneration of biological resources, including related knowledge, science, technology, and innovation, to provide sustainable solutions (information, products, processes and services) within and across all economic sectors and enable a transformation to a sustainable economy. The bioeconomy is not a static notion and its meaning is continually evolving.

Local and global adoption of the Bioeconomy is necessary to achieve the United Nations Sustainable Development Goals, including facilitation of sustainable income and employment growth in the low-income countries.

A significant number of countries have adopted either a national Bioeconomy-dedicated strategy or strategies related to biotechnology and/or renewable resources. International organisations have recognised Bioeconomy as a key driver for sustainable development, climate change mitigation and economic growth.

The IACGB (International Advisory Council on Global Bioeconomy) sees a need for urgent action to bring the Bioeconomy to the attention of all, including younger generations, policymakers, private sector, and financing sectors as well as people striving to find solutions for societal and economic transformation.

We recommend that countries, regions, industry, communities, and partners:

- Integrate bioeconomy strategies into economic policy.
- Create a Global Bioeconomy Partnership bringing different existing initiatives together to share perspectives.
- Facilitate development of standards for fast and broad market access for bioeconomy innovations.
- Support regional and local initiatives to grow and connect with the Global Bioeconomy.
- Include teaching of Bioeconomy principles and exemplars as part of all education levels.

I. History – key events and status of the bioeconomy

a. Revisiting the GBS recommendations developed by IACGB from 2015 to 2020

GBS2024 is the first Global Bioeconomy Summit (GBS) hosted outside Germany. GBS now moves to different places around the globe. The GBS started in 2015 with the aim to bring together bioeconomy experts from all hemispheres and from diverse scientific, industrial and political backgrounds to truly represent the interdisciplinary and diverse nature of bioeconomy. A key aspect has included discussion on how bioeconomy can contribute to achieving the Sustainable Development Goals (SDGs). A specific goal is that the bioeconomy is included in international and global fora on innovation, climate, biodiversity, education and sustainable development.

About the IACGB

The International Advisory Council on Global Bioeconomy (IACGB) is an independent think tank composed of high-level bioeconomy leaders and experts from all hemispheres, representing different backgrounds and expertise. While the members of the IACGB serve in their personal capacity, many of them also advise the bioeconomy landscapes and governments of the countries or regions to which they relate. The IACGB initiates, designs and organizes the Global Bioeconomy Summit, a leading global conference and platform for exchange and discussion of recent developments for a sustainable and circular bioeconomy worldwide. For more information please, visit www.iacgb.net

IACGB and the GBS series

The IACGB[1] was initially formed to support the planning and organization of GBS2015 and has since been maintained, expanded and updated. IACGB is a think tank with the mission to promote the Global Bioeconomy as a sustainable and forward-looking pathway for the benefit of planet and people. The IACGB provides leadership for setting the topics and themes of GBS and for selecting high level experts and government representatives for the plenaries and panel discussions. It aims to advance a holistic understanding of the sustainable bioeconomy concept, and to inspire stakeholders around the globe to adopt the IACGB recommendations and to facilitate their implementation.

Previous Recommendations for driving the Global Bioeconomy

- **Communiqués** (indicating the latest state of Global Bioeconomy and advising on the way forward to a sustainable and biobased economy) are a main outcome of the GBSs. The Reports on National Bioeconomy Strategies update progress globally. Looking at the development of the Global Bioeconomy in the past 10 years, it seems timely to reflect on the past and to look forward to the future (see Annex 1 for details). The Communiqué from GBS 2015 outlined cornerstones of a global agenda, together with policy measures, leading to a sustainable bioeconomy[2].
- The Communiqué in 2018[3] stressed the importance of the social impact of a bioeconomy and the Communiqué issued from GBS2020[4] specifically emphasized the bioeconomy's role in the transformation of industry.
- In 2023, the IACGB recognized that the role of the bioeconomy is advancing in providing sustainable solutions for global challenges. In conclusion, these key areas of the bioeconomy have not lost their urgency and timeliness today.[5]

The recommendations of actions for global bioeconomy policy are still valid. They include:

- capitalizing on the power of science and technology,
- seizing the opportunity bioeconomy offers in creating jobs, and
- establishing financing platforms to promote investment into the bioeconomy.

[1] www.iacgb.net
[2] https://gbs2020.net/wp-content/uploads/2021/10/Communique_final_neu.pdf; https://www.nature.com/articles/535221a
[3] https://gbs2020.net/wp-content/uploads/2021/10/GBS_2018_Communique.pdf
[4] https://gbs2020.net/wp-content/uploads/2020/11/GBS2020_IACGB-Communique.pdf
[5] https://www.iacgb.net/lw_resource/datapool/systemfiles/elements/files/0cb0102c-4d6e-11ee-8305-dead53a91d31/current/document/IACGB_Statement_Hannover_August_2023.pdf

To grow the bioeconomy as a significant force, one of the most important recommendations was enabling and supporting the development of industry and business and introduction of suitable policy (e.g., tax, subsidy, etc.) measures to allow them to compete against traditional fossil-based products and technologies.

The Communiqué of GBS2024 builds on these developments, highlighting recent policy developments and guiding principles for a Global Bioeconomy, while recommending the way forward.

b. Key policy developments of recent years

We have identified a number of important political events and processes that have decisively influenced the growth of the Global Bioeconomy. These are clearly driven by the urgent need to address climate stress, biodiversity loss, and global pandemics, as well as the emergence of new opportunities through rapid advances in science.

Bioeconomy strategy development and implementation worldwide

A significant number of countries have adopted a national bioeconomy-dedicated strategy or strategies related to biotechnology and/or to renewable resources. Several have also recently reviewed and revised their strategies since being put in place up to 10-15 years ago.

The Reports on the national strategies – published in 2015[6], 2018[7], 2020[8] and 2024[9] show that the number of countries with bioeconomy strategies increased sharply from 20 (in 2015) to more than 60 (in 2024) reflecting the accelerated adoption of the bioeconomy within their economic frameworks.
Strategic visions of the bioeconomy for countries, regions and cities and organisations align to their specific contexts. Recognizing the bioeconomy as a key enabler, they seek to adapt existing and new technologies (e.g., biorefineries) to local conditions. These strategies also address environmental, social and economic challenges and initiate immediate change (e.g., entrepreneurship, capacity development, job creation). However, there are also negative voices in society regarding risk and change. International and multilateral cooperation are seen as key building blocks for success.

The 2024 study by the IACGB identifies some trends likely to become important in the future development of the bioeconomy. Examples include the emergence of stakeholder-driven and industry-driven strategies (Argentina, Canada, US), bioeconomy policy initiatives launched under the lead of supra- and international organizations (International Bioeconomy Forum), World Economic Forum (WEF), UN Food and Agriculture Organization (FAO)), and macro-regional policy approaches among neighboring countries with similarities in their resource endowment and economic conditions (East African Community, BIOEAST - Central-Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy, Nordic Council of Ministers, Latin American Bioeconomy Network, ASEAN - The Association of Southeast Asian Nations).

Global policy organizations have recognized the bioeconomy as a key driver for sustainable development, climate change mitigation and economic prosperity.

Among those these are the most important ones (see Annex 2 for details): G20, G7, UN Environment Program, United Nations Industrial Development Organization (UNIDO), FAO, WEF, and ASEAN.

c. Critical turning points in society and environment shaping changes in thought and behavior

In addition to the above measurable key political developments, we observe recent changes in global debates that have brought about significant changes in bioeconomy awareness.

[6] https://gbs2020.net/wp-content/uploads/2021/10/Bioeconomy-Policy_Part-I.pdf; https://gbs2020.net/wp-content/uploads/2021/10/Bioeconomy-Policy_Part-II.pdf
[7] https://gbs2020.net/wp-content/uploads/2021/10/GBS_2018_Bioeconomy-Strategies-around-the_World_Part-III.pdf
[8] https://gbs2020.net/wp-content/uploads/2021/04/GBS-2020_Global-Bioeconomy-Policy-Report_IV_web-2.pdf
[9] https://www.iacgb.net/lw_resource/datapool/systemfiles/elements/files/52440fb0-f35d-11ee-9ed1-dead53a91d31/current/document/Global_Bioeconomy_-_April_2024_IACGB.pdf

These include:

- *COVID-19 pandemics I*: biotechnology is key to solutions in health care.
- Rapid developments in diagnosis and vaccination were instrumental in managing the COVID-19 pandemic. Biotechnology methodologies proved invaluable and saved many lives. The general public has become familiar with technologies that are key to bioeconomy innovations.
- *COVID-19 pandemics II*: supply chain resilience became significant leading to strategies that required local supply.

Economic shocks during the COVID-19 pandemic disrupted global supply chains. Weather-related and other shocks are likely to become more common over the next decade due to climate change and conflicts. Bioeconomy tools allow diversification of supply chains and, due to more local and modular production, reduced transportation. Bioeconomy can be a key factor in establishing regional value chains and reduction of imports with significant transport emissions.

- *Consumer behaviour I:* trends show decreased meat consumption
- While global meat production is still increasing, 51% of European meat consumers report reducing their meat intake. Consumers are turning to alternative proteins such as plant, microbial and insect derived proteins in both food and feed.[10]
- *Consumer behavior II*: awareness of sustainability and circularity is increasing
- Recent studies show that consumers are increasingly aware of financial and environmental benefits of circularity and sustainability in products. 46% of consumers world-wide say they are buying more sustainable products as a way to reduce their impact on the environment.[11]
- *Climate related events:* flooding, drought and extreme heat are now in everyone's backyards
- The latest Intergovernmental Panel on Climate Change (IPCC) Reports[12] warn that it is "very" or "extremely" likely that human influence is the main driver of increased greenhouse gas, increased global surface temperatures, decreased Arctic Sea ice and increased global mean sea levels. This means that the world is already certain to face further climate disruptions for centuries to come unless urgent actions to significantly reduce greenhouse gas emissions occur. This is a fatalistic yet harsh reality if no action. Almost nine-in-ten consumers (85%) say they are experiencing the disruptive impacts of climate change in their lives.[13]
- *Companies being increasingly valued by their sustainability goals and ESG criteria*: requirements to report these has increased

A bioeconomy has become a reality for many companies in recent years and a crucial pillar for regional, national and global economies. Governments and industry are leveraging this as they set their directions for a sustainable and carbon neutral future**,** striving to fulfil the obligations of the Paris agreement. SDGs and carbon neutrality cannot be achieved without including bioeconomy principles. [14]

- *New science opportunities:* rapid development of alternative products and systems, including those for space, are changing global economic developments

Modern biotechnologies are likely to transform industries and production of public goods serving people and ecologies. For example, genetic methods like high throughput sequencing, marker assisted breeding, genetic selection, gene editing, and RNAi contribute to improving the productivity of agriculture, fisheries, and forestry. Applied also to bioprocessing and bioremediation systems and other modular production tools they enable the production of biofuels, fossil free materials and fine chemicals, new foods, and contribute to new health applications treatments and development of new biopharmaceuticals. These have the potential to not only reduce the carbon impact of economic activity but also create new, often local, sustainable developments and new jobs.

[10] European Survey on readiness to adopt a plant-based lifestyle. www.smartproteinproject.eu
[11] https://www.pwc.com/gx/en/issues/c-suite-insights/voice-of-the-consumer-survey.html
[12] IPCC, 2023: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 1-34, doi: 10.59327/IPCC/AR6-9789291691647.001
[13] https://www.pwc.com/gx/en/issues/c-suite-insights/voice-of-the-consumer-survey.html
[14] One example is the Science Based Targets Initiative (SBTi) – a collaboration between the CDP, UN Global Compact, World resources Institute and WWF.

II. Challenges of today and tomorrow

During the last 10-15 years, the bioeconomy has indeed developed from a research driven field of experts to a cross-sectoral and inclusive model for a circular and sustainable economy.

To enable sustainable growth of the bioeconomy and its expansion across all market sectors, it is essential to tackle both new and old challenges. The urgency to act has become critical.

Here are the most noteworthy considerations:

a. While we are all living on the one and only planet, we need to acknowledge two worlds of development (global south and global north) with different foci

Many developed economies ("global north") have identified bioeconomy as key for sustainability and environmental health, whereas most of the emerging economies ("global south") value bioeconomy as key for providing economic growth and jobs, food, health, and environmental security. Developing the bioeconomy should help the emerging regions avoid the pitfalls of embedding a fossil economy.

In the end, both global north and south need to aspire for a sustainable bioeconomy that is universal, an economy that relinquishes dependence on fossil fuels and on harmful policies and practices and many current forms of global trade behaviours.

b. Health of human beings, animals and plants through a healthy environment (air, water, soil) that needs to be safeguarded or restored as a priority guiding principle

Clean air, clean water, sustainable food supply, biodiversity, and a resilient climate have become challenged in our industrialized world through relying on fossil resources. We are now facing climate change, growing pressure on natural ecosystems, changed land-use patterns, agricultural intensification, and biodiversity loss mostly due to unsustainable anthropogenic activities. It is generally recognized that restoring ecosystem health and preventing and reversing global biodiversity loss are important for socio-economic development and the welfare of humanity.

c. Sufficient and high-quality food and prosperity (environmental, economic, societal) continue to be overriding objectives

Almost 50% the world's population do not have access or cannot afford a healthy diet. Food supplies are disrupted by heatwaves, floods, droughts and global conflicts. This problem has not diminished over the years but has become more urgent due to COVID-19 pandemics and conflicts.

d. Indigenous communities and traditional knowhow need to be recognized and included

Traditional knowledge has not been a significant focus of the bioeconomy, but it has a wealth of opportunity for development according to bioeconomy principles. It is an inclusive and sustainable model for Indigenous people, communities and small holder farmers to create livelihoods not at odds with climate change challenges.

e. Young people need to be heard

Education is a key factor for economic wealth and well-being. Training, education and communication are key requirements for an inclusive bioeconomy. Environmental consciousness is widely adopted among youth and using technology transfer, life-long training and empowering people by participation in bioeconomy activities allows for inclusive communication and integrative participation. Please, note the first release of a Communiqué from our IACGB Bioeconomy Youth Champions.

III. Recommendations for the way forward

Based on the guiding principles (see Annex 3), in response to the challenges and in consideration of the current state of the global bioeconomy, we emphasise an **urgency to act** and we propose a **set of recommendations** for international bioeconomy policy:

a. Integrate bioeconomy strategies into economic policy

For planetary resilience the bioeconomy must become an integral part of sustainable development frameworks and economic strategies worldwide.

As a key solution the bioeconomy enables transformation towards a fossil-free, sustainable, regenerative and circular global economy. Integration of bioeconomy solutions into everyday life will drive the urgent transformation of the economy and society. It is crucial that the bioeconomy is part of the climate change, biodiversity and food systems agendas as outlined by the UN Summits and IPCC reports.

This requires cooperation among various Conventions and Initiatives such as those on Biodiversity (CBD), Desertification (UNCCD), the Earth Microbiome (EMP), the International Nitrogen Initiative (INI), The One Health Tripartite, or UNESCO Ocean Science for Sustainable Development (UNDOSSD. Additionally, promoting collaboration between major bioeconomy and economic fora (e.g., Conference of the Parties (COP), World Business Council for Sustainable Development (WBCSD), Food and Agriculture Organization of the United Nations (FAO), UNIDO, UNEP, Organisation for Economic Co-operation and Development (OECD), International Bioeconomy Forum (IBF), World BioEconomy Forum (WCBEF), World Economic Forum (WEF), G20 forum and G7 forum) is essential.

The IACGB think-tank calls upon organizations such as the World Bank, OECD, FAO and UNEP to integrate bioeconomy thinking and solutions into global decision-making processes.

b. Create a Global Bioeconomy Partnership bringing different existing initiatives together to share perspectives

The need for partnership, shared responsibilities and a global platform remains crucial for coherent global action. Examples of significant initiatives exist, including the International Bioeconomy Forum (launched by the European Commission and AgriFood Canada in 2016); the World Bioeconomy Forum (WCBEF, launched in 2018 as a platform for Circular Bioeconomy with mostly industry stakeholders); and the Circular Bio-based Europe Joint Undertaking (CBE JU) (a partnership between the European Union and the Bio-based Industries Consortium (BIC) (previously: the Bio-based Industries Joint Undertaking launched in 2013). Others have arisen more recently, and others that rise in the future.

IACGB strongly advocates for the formation of a global bioeconomy partnership (GBP) to assist in sharing information and lessons learned by bodies. We urgently promote a global partnership on bioeconomy to increase momentum, impact and effectiveness of bioeconomy roadmaps and strategies as well as research and education, and to consolidate and perpetuate implementation of bioeconomy measures.

IACGB with its global representation of members is ready to serve as an implementation mechanism for the Global Bioeconomy.

c. Facilitate development of standards and regulations to enable fast and broad market access for bioeconomy innovations

Sustainability metrics can serve as a measurable tool to monitor how businesses across the bioeconomy sectors and the supply chain contribute to reducing carbon emissions, ensuring water security (supply and quality), soil security (reducing soil degradation), promoting regeneration, and preserving healthy terrestrial and marine ecosystems and biodiversity at scale while boosting the bioeconomy. This should include dedicated financial instruments to enable fair competition against fossil incumbents. Overall it is critical to ensure that economic growth respects ecological boundaries and leads to positive societal outcomes.

d. Support regional and local initiatives to grow and link with the global bioeconomy

Both local and global deployment of bioeconomy solutions is necessary to enable achievement of the United Nations Sustainable Development Goals. Bottom-up initiatives are shaping local bioeconomy innovations and are transforming rural and industrialised regions globally. The bioeconomy generates employment in rural

areas by linking farmers to new markets, enabling local biomanufacturing, and adding value to bio-based products, while also providing solutions to strengthen the resilience of local and regional food supplies.

As the bioeconomy matures it is important to ensure equal opportunities in global markets to achieve a sustainable and climate-neutral economy. This would involve aligning strategies, consolidating roadmaps and connecting activities.

e. Include teaching Bioeconomy principles at all education levels

Bioeconomy concepts and activities should be included at all stages of education to enhance Youth participation and drive future change. This is particularly critical in the Global South to enable transitions in future urban design and biomanufacturing that co-exist well with food and ecological/biodiversity needs.

Annexes

Annex 1 – Communiqués and Recommendations 2015 to 2020 and the IACGB definition of a Bioeconomy.

Definition: The bioeconomy is the production, utilization, conservation, and regeneration of biological resources, including related knowledge, science, technology, and innovation, to provide sustainable solutions (information, products, processes and services) within and across all economic sectors and enable a transformation to a sustainable economy.[15] The bioeconomy is not a static notion, and its meaning is continually evolving.

The **2015** Communiqué[16] emphasizes that a sustainable bioeconomy will make essential contributions to the implementation of the 2030 Agenda for Sustainable Development, by promoting distinct features of interest in several SDGs: knowledge-based growth and jobs, the renewability of resources, regeneration and resilience of ecosystems, quality and value-orientation, resource efficiency and circularity, as well as creativity and innovation. Five cornerstones were defined and allude to (i) optimal use of biomass and biological resources with the goal to conserve nature and minimize waste value-networks; (ii) monitoring in order to measure bioeconomy and its contribution to sustainable development; (iii) expansion of international collaboration in education, research and development for creating synergies; (iv) more support of the biobased private sector and enhanced participation of citizens; and (v) the need for bioeconomy to become integrated in multilateral policy processes, such as COP and trade conferences.

GBS **2018** urged for innovation as a key driver and for international collaboration as key elements of an inclusive bioeconomy for all.[17] Bioeconomy was recognized as a transformative force for sustainable development. Newly emerging topics were the links between climate change, health impacts and bioeconomy, digitization and converging technologies in the bioeconomy, communication and trust in transformative sciences and technologies, interdisciplinary education and training at all levels in bioeconomy, biodiversity as a resource and foundation for bioeconomy, sea and ocean bioeconomy, innovative ways of financing and bioeconomy in the cities or "biocities" (urban bioeconomy). The GBS2018 communique further emphasizes that bioeconomy needs to be seen in the context of grand societal challenges and calls for an increase in multilateral dialogue and collaboration, including research and development, governance and capacity building. It was noted that bioeconomy development globally is driven by three broad forces: (i) societal aspirations and good governance for sustainable development and for improved health and wellbeing, (ii) opportunities of valorization and protection of biological resources, including residues, (iii) scientific breakthroughs in biological, digital and other technology fields.

The Communiqué of GBS **2020** stated that the transition to the bioeconomy is more critical than ever before.[18] The bioeconomy was described as a globally impactful transformative force in industries and manufacturing on the supply side, and as a transformative force for consumption change and waste reduction on the demand side. The communiqué points to three key ways how bioeconomy can significantly contribute to mitigate the challenges and help planet and people. These are contributions to health and wellbeing, also considering a key element in "building back better" during and after Covid-19 by building resilient supply chains, conscientiously applying science and technology breakthroughs, and taking climate action for protecting ecosystems and biodiversity with and for sustainable bioeconomy.

IACGB reflected on these key elements in a **2023** paper (Hannover Statement)[19] and re-emphasized the three overarching contributions of the bioeconomy to people and planet: (i) bioeconomy for health and wellbeing as a key element in building back better during and after Covid-19, (ii). science and technology breakthroughs being essential for advancing the sustainable and circular bioeconomy, and (iii) advancing sustainable bioeconomy solutions to address climate change, protect and restore ecosystems and preserve biodiversity.

[15] https://www.iacgb.net
[16] https://gbs2020.net/wp-content/uploads/2021/10/Bioeconomy-Policy_Part-I.pdf; https://gbs2020.net/wp-content/uploads/2021/10/Bioeconomy-Policy_Part-II.pdf
[17] https://gbs2020.net/wp-content/uploads/2021/10/GBS_2018_Communique.pdf;
[18] https://gbs2020.net/wp-content/uploads/2020/11/GBS2020_IACGB-Communique.pdf
[19] https://www.iacgb.net/lw_resource/datapool/systemfiles/elements/files/0cb0102c-4d6e-11ee-8305-dead53a91d31/current/document/IACGB_Statement_Hannover_August_2023.pdf

Annex 2: Bioeconomy in Global Agendas

G20 is hosted by Brazil in 2024 and has adopted bioeconomy as a strategic pillar (started in India in 2023, probably to be continued in South Africa in 2025). The G20 Initiative on Bioeconomy identified ten "high-level principles" for action that recognize the "remarkable potential of bioeconomy to contribute to building a sustainable future and fostering economic growth for all".[20] The high level principles are sustainable development and eradicating hunger and poverty, inclusivity and equality, advancement of global climate change mitigation and adaptation efforts, contribution to the conservation of biodiversity and sustainable use and regeneration of degraded areas. They advocate the development of the Bioeconomy through country-specific approaches, safe and responsible use of science, technology, innovation and traditional knowledge, robust policy frameworks, measurable, criteria and methodologies to assess sustainability, international collaboration and cooperation.

G7 (2024, Italy) acknowledged the need to foster advancements in new and emerging technologies, including biotechnology, and urged for Circular and Sustainable Bioeconomy as cross cutting actions.[21]

UN Environment Program (2024) accepts bioeconomy as critical strategy for coping with fossil fuel shortage and climate change.[22]

UNIDO (2022) states that fostering the bioeconomy brings unprecedented opportunities to transform economies of developing and least developed countries through biobased value chains and industries while avoiding negative environmental impacts of conventional industrialised pathways.[23]

FAO Strategic Framework 2022-2030 incorporates bioeconomy for agriculture and the environment within the Programme Priority Areas under the Better Environment strategy area. It particularly addresses SDG 12 targets.[24]

The World Economic Forum (2024) states that key drivers of bioeconomy development are technological advancements; they call for integration between sectors and suggest it is conceivable to reconcile bioeconomy growth and ecosystem conservation and restoration.[25]

Global Forum for Food and Agriculture, Germany / Berlin, January 2025: Under the title **Farming a Sustainable Bioeconomy,** it states that a sustainable, circular bioeconomy can play a key role in the further development towards a sustainable and resilient resource base, and that the bioeconomy transition has great development potential, it is resource-preserving and provides new sources of income.[26]

ASEAN (2024) Discussions led by RGE outline activities adopted by AESAN[28]. One example is the ASEAN Centre for Biodiversity Memorandum of Understanding with the ASEAN Business Advisory Council to establish biodiversity-friendly investment standards across ASEAN member states. Another includes establishment of bioeconomy as part of the Framework for Circular Economy for the ASEAN Economic Community.

[20] https://www.gov.br/secom/pt-br/assuntos/noticias/2024/09/g20-chega-a-consenso-e-estabelece-principios-de-alto-nivel-sobre-bioeconomia/11092024-g20-principios-bioeconomia-pdf-em-ingles.pdf
[21] https://www.g7italy.it/wp-content/uploads/G7-Science-and-Technology-Ministers-Meeting-Communique.pdf
[22] http://www.unep-iemp.org/cnfile/2024/04/24/1713939404354.pdf
[23] https://www.unido.org/sites/default/files/files/2022-07/BIO_ECONOMY_FACTSHEET.pdf
[24] https://openknowledge.fao.org/server/api/core/bitstreams/29404c26-c71d-4982-a899-77bdb2937eef/content
[25] https://www3.weforum.org/docs/WEF_Accelerating_the_Tech_Driven_Bioeconomy_2024.pdf
[26] https://msc.gffa-berlin.de/app/uploads/sites/5/2024/09/ENG-2025-GFFA-Background-Paper.pdf
[28] https://www.ecosperity.sg/en/ideas/valuing-nature-in-ASEAN-bioeconomy.html

Annex 3: Guiding principles of the Global Bioeconomy

Recognizing the development of the bioeconomy during recent years we propose the following as guiding principles. While there is a need for broader adoption of biobased materials and products, it remains critical to source these materials sustainably and operate within ecological boundaries.

The world advances into a fossil-free (fossil-reduced) era.

We acknowledge that sections of industry are increasingly developing and adopting bioeconomy solutions as part of their sustainability and decarbonization efforts. The next step forward for the bioeconomy is on the one hand scaling up so that products and processes will reach market maturity in a higher number and in shorter time intervals.

On the other hand, bioeconomy principles need to be adopted by traditional industries, such as the construction sector or the steel industry. In this respect, the adoption of carbon from CO_2 as a bio-based building block is promising and opens up opportunities for carbon intensive processes. These processes might be coupled to CO_2-utilizing biological processes as they are already established with phototrophic microorganisms and bacteria (and researched as new non-organism-based structures). Early-adopter industry sectors have grabbed the idea and concept of bio-based production and technologies (eg the chemical industry the textiles industry and forestry generally), but wider usage of agreed global standards and measures for bio-based products and materials must still be demanded.

Fossil fuel and resource-based industries are fighting for their place. There is a lack of removal of subsidies for fossil raw materials and products and few if any incentives for bioeconomy products and services. Transforming fiscal policies and incentive structures is essential: a level playing field is a must.

Bioeconomy promotes a knowledge-driven future for sustainable economies based on biomass, biotechnology, circularity and digital innovations with the aim to provide health/well-being, food, housing for all.

Bioeconomy is key to development of knowledge-based growth and jobs, the renewability of resources, resilience of ecosystems, circularity (and waste), as well as efficiency and value-addition. Biobased solutions frequently provide innovative or unique benefits, which facilitate sustainable consumption. Bioeconomy builds on different types of biological innovations and protects and regenerates renewable natural resources, providing local, regional, social and economic development opportunities.

New and emerging opportunities are particularly present in materials including for construction, packaging, transportation (aviation and shipping industry), in processes including synthetic biology-based production of chemical building blocks and using CO_2 as a carbon source, in manufacturing including mobile or modular biorefineries and precision fermentation for protein production, in agriculture and food systems including regenerative forestry and land/ocean farming producing multiple materials for health and food security as well as bioproducts, in architecture and urban design including green cities and urban farming, in agriculture technologies as means to better make use of and better manage natural resources, inputs and productions.

This particularly includes the Global South; promoting their innovations and ensuring their bioeconomy based goods can compete globally.

Actions and programs are to be nature-positive, resilient and inclusive.

Bioeconomy strategies and roadmaps need to be sustainable, they need to aim at halting and reversing biodiversity loss (natural positive). Through diversification and adapting biomass management and use to local conditions, bioeconomy can strengthen resilience to counter challenges, such as extreme weather events, climate change, and ecosystem degradation. Training, education and communication are key requirements for an inclusive bioeconomy. Using technology transfer, life-long training and empowering people by participation in grass root activities allows for inclusive communication and integrative participation and understanding. Societal changes are necessary and should be promoted (such as uptake of more sustainable lifestyles, inclusion of diverse societal groups and youth perspectives, and changed consumer behavior in mobility and consumption patterns).

We suggest including the following as key elements into roadmaps and bioeconomy strategies:

- Development of international frameworks for trade
- Measures to enable broad market access for bio-products including financing instruments to allow for fast development
- Global alignment of regulations reflecting safety, security and allowing for innovation
- Incentives for changes in consumer behavior (food, transport /mobility, materials)
- Education to prepare for jobs and entrepreneurship

Annex 4: List of IACGB Members

- Mohamed Ait Kadi
- Kristian Berg Poulsen
- Regina Birner
- Anne Bogdanski
- Hugo Chavarría
- Emily Cranston
- Ben Durham
- Julius Ecuru
- Ahmed Fahmi
- Fabio Fava
- Martin Greimel
- Kanyawim Kirtikara
- Richard Kitney
- Christine Lang
- Yin Li
- Mogens Lund
- Elspeth MacRae
- Jussi Manninen
- Mary Maxon
- Wataru Mizunashi
- Paulus Mungeyi
- Órlaith Ní Choncubhair
- Ian O'Hara
- Christian Patermann
- Lucía Pittaluga
- Vladimir Popov
- Marcelo Regunaga
- Adrián Rodriguez
- Ulrich Schurr
- Omid Tavakoli
- Flora Ismail Tibazarwa
- Eduardo Trigo
- Daniel Vargas
- Ivar Virgin
- Anna van Paddenburg
- Joachim von Braun
- Peter Wehrheim